mass types and also to the probable range of equivalent-potential temperatures. In view of recent discoveries of the meteorological significance of isentropic charts it is further recommended that more attention be given to the slope of potential temperature surfaces in situations free from condensation. Allowance should be made for the possibility of horizontal mixing on isentropic surfaces and unless the isentropic surfaces in one air mass actually intersect the ground or at least show a sudden increase in slope, the synoptic analyst should label the air masses differently with caution.

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JOHN G. ALBRIGHT. *Physical Meteorology.* New York (Prentice-Hall), 1939. xxx, 392 pp., 246 figs.

This book, as implied by the title, emphasizes the physical rather than the descriptive or statistical aspects of meteorology; it is primarily an elementary exposition of the fundamental physical laws to which atmospheric phenomena conform, and an application of these laws to the explanation of the more important physical phenomena of the atmosphere. The book is intended as an introductory college textbook. It presupposes a working knowledge of physics, although a chapter on the principles of the theory of heat is included. The treatment is essentially nonmathematical, but a number of simple mathematical formulae are quoted and derivations are given for most of them.

The introductory chapter is devoted to a description of the scope of meteorology and its place among the sciences, with a brief historical sketch. After a chapter on the atmosphere in general, the succeeding chapters consider in detail, barometric pressure, temperature, insolation, and atmospheric water vapor. A chapter on the thermodynamics of the atmosphere includes a discussion of lapse rates and stability; and is followed by chapters on the wind, the dynamic theory of air movements, and a brief description of the planetary circulation. Consideration is next given to condensation, clouds, and the various forms of precipitation, followed by two chapters on tropical and extratropical cyclones, including a description of tornadoes and brief reference to the methods of air-mass analysis. The book is concluded by chapters on atmospheric electricity (including the aurora), thunderstorms and lightning, atmospheric acoustics, and atmospheric optics.—*Edgar W. Woolard.*

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[RICHMOND T. ZOCH, *in Charge of Library*]

By AMY P. LESHER

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SOLAR OBSERVATIONS

[Meteorological Research Division, EDGAR W. WOOLARD in charge]

SOLAR RADIATION OBSERVATIONS, JULY 1939

By CHARLES M. LENNAHAN

Measurements of solar radiant energy received at the surface of the earth are made at eight stations maintained by the Weather Bureau, and at 10 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Washington, D. C., Madison, Wis., Lincoln, Nebr.) and at the Blue Hill Observatory of Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau stations at Washington and Madison.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data, obtained up to the end of 1936, will be found in the MONTHLY WEATHER REVIEW, December 1937, pages 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parenthesis). At Madison and Lincoln the observations are made with the Marvin pyrheliometer; at Washington and Blue Hill they are obtained with a recording thermophile, checked by observations with a Marvin pyrheliometer at Washington and with a Smithsonian silver disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

During July, normal incidence intensities averaged below normal at Madison and Blue Hill and slightly above normal at Lincoln and Washington.

Total solar and sky radiation averaged above the May normals at all stations with the exception of Miami and Riverside.

Beginning with this issue data will be included in table 2 for Cambridge, Mass. These data are furnished through the cooperation of Massachusetts Institute of Technology; Prof. H. C. Hottel of the Department of Chemical Engineering has offered to supply these data regularly. The average daily total of solar radiation for the first week of record (June 25–July 1, 1939) was 426 gram-calories per square centimeter.